DOCUMENT RESUME

ED 133 721 CS 003 163

AUTHOR Crano, William D.; Johnson, Charles
TITLE Facilitative Effects of Map Interpretation on Reading Skills.
PUB DATE 76
NOTE 9p.; Paper presented at the Annual Meeting of the American Psychological Association (84th, Washington, D.C., September 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Low Income; *Map Skills; *Programed Instruction; Reading Comprehension; Reading Instruction; *Reading Programs; *Reading Skills; Reading Speed; *Remedial Reading; Rural Youth; Secondary Education

ABSTRACT

A programed reading curriculum involving map-graph skill acquisition was evaluated experimentally with 77 rural adolescents. Subjects, who were financially impoverished and three to four years behind national reading norms, were assigned randomly to the reading program alone or to the reading program supplemented by self-instructional exercises involving map-graph interpretation. On the basis of prior research, it was predicted that a reading program would produce substantial gains in reading-test scores and that these gains would be significantly higher for subjects receiving map-graph instruction. Both hypotheses were supported. Findings showed that the map-trained students made significant gains in reading speed, accuracy, and comprehension. Vocabulary scores were not affected by the program. (JM)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED133721

FACILITATIVE EFFECTS OF MAP INTERPRETATION ON READING SKILLS

WILLIAM D. CRANO AND CHARLES JOHNSON

MICHIGAN STATE UNIVERSITY

This report describes the outcome of a training program aimed at the the amelioration of reading difficulties of a sample of rural poor children. This problem is a central concern for educators, as the inadequate training of even rudimentary reading skills represents a continuing indictment of our educational system. (In 1971, for example, a Harris poll estimated that there were more than 21 million Americans who could not read even a simple want-ad). Far from affecting all segments of the society, this problem is particularly acute among those of lower socioeconomic standing, who appear not to benefit maximally from the typical educational experience provided by the school systems of this country (see Coleman et al., 1966).

In a search for alternatives to the usual educational practices, a number of different programmed approaches have been employed, with widely varying effect. Gormly and Mittoli (1971), for example, demonstrated the effectiveness of the Reading Attainment System (Grolier Press, 1967) on the reading scores of urban, black males of low reading achievement, who had previously proved impervious to ameliorative programs. In explaining the variable performance of programmed learning approaches in general, and the specific success of their program, Gormly and Mittoli suggested that poor and disadvantaged students showed maximal performance gains when the programmed materials provided for self (and self-paced) instruction, were individualized with respect to difficulty level, and provided information of high interest value. In part, the present investigation was an effort to extend these three curriculum principles beyond the urban, black males in Gormly's research to a group of white, rural adolescents of both sexes.

CS 003 163

A second aim of this research was the implementation of recent findings indicating the operation of very different patterns of academic development among children of differing socioeconomic status. In answer to the question, "Does intelligence cause achievement?", the cross-lagged panel correlational research of Crano, Kenny, and Campbell (1972) provided an affirmative response, at least among children of high and moderate SES. The application of this methodological model for the inference of causal relationships to the data of 1500 low SES children disclosed a very different pattern of development, however, as the operation of concrete academic skills appeared to herald the development of later, more abstract attainments. More specifically, the factors involved in map and graph interpretation appeared to operate causally with respect to the more abstract skills assessed in tests of reading comprehension, verbal intelligence, etc. (see Crano, 1974). Whether enhancement of reading performance would result as a consequence of training in map and graph interpretation constituted the second, and perhaps the major, question of this research.

Method

Subjects

A group of 77 adolescents (48 males, 29 females) with an average age of 17 years, drawn from nine rural counties in central Michigan, constituted the subject sample. All subjects were participants in a U.S. Department of Labor sponsored summer program, which was open only to youth whose families fell below the Department's poverty guidelines. Only those individuals whose level of reading attainment was three to four years behind that of their age group on national norms were used as subjects.

Measure

Alternate forms of Survey D (for grades 4-6) of the Gates McGinitie reading test (1965) were employed before and after the completion of the program. This objectively scored test was used throughout the state of Michigan to evaluate the reading attainments of students in all state supported schools and special programs. The test provided measures on four areas of reading competence: speed, accuracy, vocabulary, and comprehension.

Materials

The Reading Attainment System is composed of 240 graded reading lessons of high interest to adolescents. Each lesson was accompanied by a glossary of possibly unfamiliar words appearing in the lesson, instruction on various language skills, and a 10-item self-administered and self-scored test of comprehension. The material was graded into 12 levels of difficulty, with 20 exercises available at each level.

A series of self-instructional exercises for the development of map and graph interpretation skills, similar in format to the reading system were developed by the authors of this study. Materials were graded with respect to difficulty, and at each of five difficulty levels, four exercises (which consisted of a map or graph, followed by a series of self-scored questions which could be answered from an accurate interpretation of the materials) were provided.

Procedure

After the pretest, subjects fulfilling the criteria noted earlier attended reading "classes" in one of six training centers for 90 minutes, two days each week for six weeks. It is important to note that during these sessions, the role of the "teacher" was severely circumscribed. He made no attempt to tutor or coach students, and never admonished them for

lack of achievement. Occasional provision of positive reinforcement and the maintenance of an orderly classroom situation were the teacher's principal duties.

Results

Normed grade equivalent scores attained at pretest and posttest on the four subscales of the Gates-McGinitie test constituted the primary dependent measures. The data were entered in four separate two-way analyses of variance, which assessed the effects of the map interpretation training over the course of the program (see Table 1). These analyses indicated significant effects attributable to the map training program on three of the four reading measures. In addition both map-trained and nontrained groups evidenced significant pretest-to-posttest gains in reading speed ($\bar{X}$= 2.42 years gain), accuracy ($\bar{X}$= 1.52 years gain),and

Insert Table 1 about here

comprehension ($\bar{X}$ = 1.00 year gain). Of central importance for this investigation, however, were the significant interactions of the Map Training factor with Measures. Inspection of the means constituting these interactions indicated that the overwhelming preponderance of the gains evidenced over the course of the program was attributable to the scores of the children who had undergone map interpretation training. While both groups began the program with essentially identical pretest scores, the map-trained subjects far outstriped their peers in mean gains on the reading speed (X=3.79 vs 1.25 years gained), accuracy (X=2.73 vs 0.48 years gained), and comprehension (X-1.28 vs. 0.53 years gained). Vocabulary scores were not affected by the program.

Discussion

The obtained results of this investigation may be somewhat unexpected, given the divergence of this program from the usual approaches. In addition to the fact that there is little obvious connection between map interpretation

and prose reading, and that the map reading exercises occupied only a small fraction (20 minutes per session) of the limited program time, it must also be stressed that these exercises provided no instruction, per se, but merely provided the subject a series of intriguing spatial puzzles to solve. Current approaches to remediation would not lead to the expectation that such an apparently unrelated, minimal, and self-administered regimen would produce such impressive reading skill differences between treated and untreated groups. And yet, the variables manipulated in this research were well grounded in previous theoretical developments (e.g. Crano, 1974), and were quite consistent with the general orientation of Piaget (1950, 1952), who viewed the acquisition of higher order abilities (or schema) to be a function of the coalescence of numerous specific, lower level skills.

Identification of specific lower level acquisitions which might stimulate more rapid development of higher order readings skills has proved problematic, but with the advent of more powerful and sensitive methodological techniques (e.g. path analysis, cross-lagged panel correlational approaches, etc.) such a process appears more tractable. On three of the four dependent measures employed in this study, significant and substantial differences were observed, with children exposed to the map reading exercises evidencing far greater gains than their peers who, in all other respects, were provided exactly the same training regimen. While potential selection artifacts might have operated to inflate with mean gain over all subjects, such an alternative cannot be made to explain the between-groups differences obtained in the research. (Investigation of this question, along with a consideration of regression-free change against a national sample will be presented in the expanded version of this report.)

The failure of the program to effect changes in vocabulary is understandable in light of Jensen's (1969) contention that such tests are relatively efficient indicators of intelligence. It is perhaps unreasonable to expect a significant modification of intellectual ability over the course of a six-week remedial reading program. That such a major impact on three important reading skills could be effected through the imposition of such a minimal program, however, is quite encouraging, and provides grounds for confidence in the validity of the theoretical underpinnings of the experiment. With greater refinement of the training program, and a longer time span with which to operate, it is conceivable that even more impressive findings will be obtained in future research.

Table 1. Obtained F Ratios and (Mean Square) Error Terms for Each Subtest

Source	df	Speed	Accuracy	Vocab.	Comp.
Map Training (A)	1	9.55***	4.93**	1.37	2.86*
Ss within groups	74	(8.24)	(10.04)	(8.15)	(11.67)
Pre-Post Measures(B)	1	91.90***	44.82***	0.22	19.59***
A x B	1	25.20***	24.38***	0.03	4.95**
B x Ss within groups	74	(2.42)	(1.96)	(1.28)	(1.93)

*p<.10

**p<.05

***p<.01

References

Coleman, J.S., Campbell, E.Q., Hobson, C.J., McPartland, J., Mood, A.M., Weinfeld, F.D., and York, R. L. Equality of educational opportunity. Washington, D.C.: U.S. Department of Health, Education and Welfare, U.S. Government Printing Office, 1966.

Crano, W.D. Causal analyses of the effects of socioeconomic status and initial intellectual endowment on patterns of cognitive development and academic achievement. In D.R. Green (Ed.), The aptitude-achievement distinction. Monterey, Cal.: CTB/McGraw-Hill, 1974.

Crano, W.D., Kenny, D., and Campbell, D.T. Does intelligence cause achievement? A cross-lagged panel analysis. Journal of Educational Psychology, 63, 258-275.

Gates, A.I., and McGinitie, W.H., Gates-McGinities Reading Tests. New York: Teachers College Press, Columbia University, 1965.

Gormly, J., and Nittoli, M.J. Rapid improvement of reading skills in juvenile delinquents. Journal of Experimental Education, 1971, 40, 45-48.

Jensen, A. R. How much can we boost IQ and scholastic achievement? Harvard Educational Review, 1969, 39, 1-123.

Reading Attainment Systems, New York: Grolier Educational Corporation, 1967.